Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Visualization of bacterial flagella dynamics in a viscous shear flow[1] JAMEL ALI, Drexel University, MINJUN KIM, Southern Methodist University — We report on the dynamics of tethered bacterial flagella in an applied viscous shear flow and analyze their behavior using image processing. Flagellin proteins were repolymerized into flagellar filaments functionalized with biotin at their proximal end, and allowed to self-assemble within a micro channel coated with streptavidin. It was observed that all attached flagellar filaments aligned with the steady shear flow of various polymeric solutions. Furthermore it was observed that many of the filaments were stretched, and at elevated flow rates began to undergo polymorphic transformations, which were initiated at one end of the flagellum. When undergoing a change to a different helical form the flagellum was observed to transform to an oppositely handed helix, as to counteract the viscous torque imparted by the shear flow. It was also observed that some flagellar filaments did not undergo polymorphic transformations, but rotated about their helical axis. The rate of this rotation appears to be a function of the applied flow rate. These results expand on previous experimental work and aid in the development of a novel platform that harnesses the autonomic response of a 'forest' of bacterial flagella for engineering applications.

[1]This work was funded by NSF Grant CMMI-1000255, KEIT MOTIE Grant No. 10052980, and with Government support under and awarded by DoD, Air Force Office of Scientific Research, National Defense Science and Engineering Graduate (NDSEG) Fellowship, 32 CFR 168a

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Date submitted: 29 Jul 2016 Electronic form version 1.4